

## **CIMAS Scientific Review 20-21 February 2003**

The review team consisted of Patricia Gober, Professor of Geography at Arizona State University and former NOAA Science Advisory Board (SAB) member (Chair); Ernesto Hugo Berbery, Associate Research Scientist at the University of Maryland; John Boreman, Acting Science and Research Director of the Northeast Fisheries Science Center; Margaret Davidson, Director of NOAA's Coastal Service Center in Charleston, SC; and Dennis Moore, Leader of the Ocean Climate Research Division at NOAA's Pacific Marine Environmental Laboratory in Seattle, WA.

We visited CIMAS facilities at the University of Miami on Thursday and Friday, February 20-21, 2003. The formal agenda on Thursday consisted of a series of presentations, discussions, and a poster session organized around CIMAS's six current research themes: (1) climate variability, (2) fisheries dynamics, (3) regional coastal ecosystems processes, (4) human interactions with the environment, (5) air-sea interactions and exchanges, and (6) integrated ocean observations. On Friday, the review team met individually with Kristina Katsaros, Director of Atlantic Oceanographic and Meteorological Laboratory (AOML) and Joe Powers from Southeast Fisheries Science Center (SEFSC), CIMAS fellows, CIMAS Director Joe Prospero, and Otis Brown, Dean of the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. Questions from the committee probed the process by which new initiatives are developed, articulation of CIMAS's mission with NOAA's strategic plan, opportunities for improving coordination of joint institute directors and increasing their influence at OAR, opportunities to leverage NOAA funding to diversify CIMAS's funding portfolio, and possibilities for bench marking progress on CIMAS's six research themes.

Overall, the committee was impressed with the quality of CIMAS's scientific activities and with its ability to respond to strategic new initiatives, including the South Florida Ecosystem Restoration initiative in Theme 3 and air-surface interactions in Theme 5. Close coordination between CIMAS and the two adjacent NOAA labs, AOML and SEFSC, facilitates the integration of government and university research and leads to a highly collaborative and interdisciplinary research environment at the University of Miami site. Director Joe Prospero provides effective leadership of the institute, and morale among the staff is generally high although concern was expressed about a possible move of parts of the Rosenstiel School to a satellite campus and a perceived lack of support for CIMAS and the other joint institutes at OAR.

We have organized our report around a set of standard questions for joint institute reviews developed by the SAB. These questions deal with the unit's **science plan** including how well the vision is articulated and the extent to which it interfaces with NOAA's strategic plan, the **science review** stressing the quality, innovativeness, and usefulness of the science, **outreach and education** involving how well the fruits of science are integrated into classroom learning and public awareness, and **science management** including issues of budget, personnel, and facilities. Our discussion of the strengths and weaknesses of CIMAS vis-à-vis these criteria is followed by a set of recommendations directed both to CIMAS and NOAA headquarters.

## Science Plan:

### Strengths:

1. **Good linkage to NOAA's strategic priorities.** Research presentations and discussions with CIMAS fellows revealed a set of research themes that dovetail nicely with NOAA's new priorities in the areas of climate change, freshwater supply, ecosystem management, and homeland security. CIMAS uses a bottom-up process for planning new science initiatives based on input from scientists themselves. This process ensures appropriate buy-in from the people who eventually will seek funding, do the research, publish the results, and hand off results to operational arms of NOAA.
2. **Cross-cutting themes.** Recent CIMAS initiatives incorporate cross-disciplinary themes in ecosystem dynamics, air-sea exchanges, and interactions between humans and the environment. These cross-cutting themes are enhanced by the joint location of CIMAS with two NOAA laboratories, AOML and SEFSC. The review team sees CIMAS serving as a catalyst for cross-cutting initiatives up the administrative chain involving OAR and NMFS.
3. **Leveraging of NOAA funding.** It is clear that CIMAS scientists see the need to leverage NOAA funding to accomplish their scientific goals. Funding from non-NOAA sources enhances and strengthens NOAA's missions in environmental monitoring and stewardship. Recent achievements in this regard involve a very prestigious NSF biodiversity grant, funding from NASA, and support from the local water development district for ecosystem restoration work. These efforts need to be carefully documented so that the spin-off effects from NOAA funding can be evaluated more easily.
4. **Strongly invested in NOAA's mission.** CIMAS Senior Fellows expressed genuine interest in and enthusiasm for NOAA's future research directions. Their enthusiasm was tempered, however, by a feeling that CIMAS's voice is not heard when research priorities are established and funding decisions are made by NOAA.
5. **Emerging regional collaborations.** As a follow-up to its previous review in 1998, CIMAS has begun to develop new collaborations with other educational institutions in the region. The committee applauds these efforts at network building and encourages further developments along these lines.

### Weaknesses:

1. **Overly broad goals.** The CIMAS science vision statement of serving as a center of excellence in Earth Systems Science, using knowledge to protect the environment, and conveying knowledge to the public is too broad and does not do justice to the coherent and dynamic research program that the review committee saw during the site visit. CIMAS's relationship with NOAA can be strengthened by a more explicit mapping of current research themes onto NOAA's new strategic plan.

2. **Over reliance on traditional measures of scientific success.** CIMAS relies too heavily on traditional measures of scientific success such as the number and quality of scientific publications and citations. As society increasingly demands that the scientific community address socially relevant problems, more creative means must be identified to evaluate scientific relevance. The number of publications, technical reports and citations must be supplemented by measures that capture the hand-off of scientific findings to management and the impact of work on society. Although we acknowledge the challenges in developing performance and outcome measures, CIMAS must look for novel ways to define its contribution to science and society in both quantitative and qualitative terms.

3. **Failure to fully capitalize on local NOAA partnerships.** While the committee is sensitive to feelings of exclusion from NOAA's strategic planning process, we felt that CIMAS should exploit its strong personal and professional relationships with AOML and SEFSC to make its voice heard at NOAA headquarters.

#### **Science Review:**

1. **High quality science.** CIMAS science is strong and innovative across all six themes. The following are examples of good science with applications to societal needs.

##### *Fisheries*

CIMAS has a group of projects dealing with fisheries. They emphasize the environmental mechanisms affecting recruitment success. CIMAS has appropriately recognized the importance of an interdisciplinary approach in this field and has capitalized on a broad range of expertise at CIMAS, AOML, and SEFSC.

##### *South Florida ecosystem restoration*

Several decades of intense development in South Florida have led to environmental problems that only now are beginning to be addressed. The South Florida Ecosystem Restoration seeks to reverse the damage caused by rapid growth in the region. CIMAS participates in this initiative with several projects that include observation and analysis of chemical and physical variability, and development of theories and methodologies.

##### *Intra Americas sea (IAS) cooperation*

This project explores connections between the warm pool of the IAS, moisture budgets and precipitation over the United States. It brings together researchers with expertise in observations, data analysis and modeling. If the project succeeds in promoting its goals beyond CIMAS, it may lead to an international cooperation like the one taking place for the North American Monsoon Experiment (NAME).

##### *Applications of seasonal climate forecasts to agriculture in the southeastern USA.*

The goal of this project is to characterize stakeholder needs, uses and perceptions of climate forecasts to more effectively guide product design for agricultural uses. Several achievements of

this multi-institutional project deserve mention. First, they have a successful partnership with the Florida agricultural system; second, they organize weather schools for farmers and service training for extension agents; and last, human dimensions are well incorporated into project. The panel was impressed to see a working Human Dimensions component.

*Saharan dust effects on Atlantic hurricanes development*

In this project the causes of hurricane decay when interacting with bursts of Saharan air layer are investigated. Air masses flowing from the Sahara are largely dry and thermodynamically stable, and may keep their own character until over the Caribbean. Plans are to use aircraft and multiple satellite platforms to investigate the underlying mechanisms that affect the genesis and intensity of the tropical storms.

**2. Full integration of the social sciences.** The review team was impressed to see that human behavior is fully integrated into many of CIMAS's research projects and that social scientists are involved in projects at the critical problem formulation stage.

**3. Interdisciplinary Approaches.** Collaboration across disciplines is assumed and a way of life at CIMAS. It is part of the institute's scientific culture.

**4. Healthy scientific culture.** There is genuine enthusiasm for the scientific enterprise at CIMAS. Fellows are engaged in addressing the nation's science questions in a very positive way, suggesting a robust environment for the continued development of the Institute.

Weaknesses:

**1. Poorly organized publication list.** Quality would be easier to assess if publications were organized into peer versus non-peer reviewed outlets. The number of citations, a standard measure of impact in the scientific community, should also have been included.

**Education and Outreach:**

Strengths:

**1. MAST (Marine and Science Technology High School).** The review panel was impressed with CIMAS's participation in MAST, the magnet marine science and technology school. We encourage CIMAS to extend this learning model to other educational settings in South Florida, particularly those with sizable disadvantaged and minority populations.

**2. Explorer of the Seas.** CIMAS's participation in the Explorer of the Seas program of scientific observation aboard a new state-of-the-art cruise ship offers unlimited opportunity, not only for scientific data gathering, but also first-hand involvement of the general public in the scientific process of discovery. The program should be expanded to maintain relationships with interested participants, to keep them abreast of scientific findings from Explorer of the Seas data, to develop innovative on-board educational programs, and to cultivate human interest stories that can be publicized widely.

3. **Funding and mentoring of students.** CIMAS supports a summer program in which 12 to 18 students from MAST assist at AOML and SEFSC and then are hired during the academic year. Such programs help to cultivate the next generation of environmental scientists.

4. **Recent efforts to expand contacts.** CIMAS recently has collaborated with the local agricultural extension service to develop and deliver special climate forecast products and tools.

Weakness:

1. **Poor tracking of CIMAS-funded students.** CIMAS does not keep adequate records of the educational and career paths of students who participate in its educational programs. Such data would enable CIMAS to assess whether its educational programs translate into a larger pool of environmental scientists and improved environmental knowledge.

2. **Underdeveloped vision of education and outreach.** The committee was repeatedly told that CIMAS has few education programs because NOAA does not provide base funding for education and outreach. This is a short-sighted view that does not appreciate the long-term importance of education and outreach in a science program. CIMAS needs to be as aggressive in leveraging NOAA funding for education and outreach as it is for science and should view education and outreach as a crucial investment in public support for its science programs.

## **Science Management:**

Strengths:

1. **Effective leadership.** It was readily apparent that the director encourages free exchange of ideas among CIMAS scientists, and that his management style is well suited for the environment in which this program exists. Federal and university scientists appear to be well informed and supportive of colleagues' projects.

2. **Sound employment practices.** CIMAS management has worked assiduously to maintain parity in its salary structure, award excellence and initiative, and support professional development, thus avoiding the stigma of "second-class citizen" that often occurs with non-federal employees working in NOAA labs.

3. **Excellent relationships with NOAA labs.** The relationship between CIMAS and the local NOAA labs is as strong as we have observed in the NOAA joint institutes program.

4. **Responsive to new intellectual opportunities.** CIMAS employees are encouraged to write proposals in new areas to foster the intellectual vitality of the organization. New ideas are developed from the ground up with makes CIMAS an inclusive, rather than elitist, organization.

Weaknesses:

1. **Lack of accountability.** CIMAS management lacks routine tracking mechanisms for its

various funding sources and the output of its science, education, and outreach programs. The absence of these data makes it difficult to respond quickly to questions about the unit's productivity and impact. CIMAS management should develop a suite of metrics and qualitative nuggets to gauge the performance of its programs and their impacts on the science community and public at large.

**2. Inadequate Task 1 funding.** The fact that Task 1 activities have been level funded reduces the amount of “venture capital” available to seed new science and educational programs. The review panel sees these activities as fundamental to the long-term success of any science enterprise, just as research and development funding is vital to the success of any business. The CIMAS director should have access to discretionary funding to support projects on a limited basis before developing a full-blown proposal.

**3. Unstable administration at OAR.** Current instability at OAR caused by personnel turnover, the lack of senior-level contact person at OAR for the joint institutes, and a perceived lack of input into the strategic planning process constrains CIMAS from being as responsive as it could be to new initiatives at NOAA.

### **Recommendations:**

On the basis of our review of the materials provided by CIMAS, our site visit, and consultation among ourselves, the review team makes the following recommendations to CIMAS:

**1. Planning.** Develop a strategic vision for CIMAS that is closely aligned with NOAA's new strategic plan. Map the six current research themes onto NOAA's missions in explicit terms and use this map in requests for funding.

**2. Accountability.** Make data gathering a routine aspect of CIMAS management. These data are a vital tool for justifying public investment in science initiatives. CIMAS must view public accountability as an everyday feature of its operations, not something to be taken for granted.

**3. Creative indicators of success.** Develop quantitative and qualitative indicators of success. The former may include lists of publications, citations and science honors; numbers of students exposed to marine research in CIMAS programs; hits on the CIMAS website; and the ratio of NOAA to non-NOAA funding. The latter might include a case study of how results of CIMAS science improve weather forecasting or testimonials from students who were mentored in CIMAS educational programs.

**4. Leverage NOAA funding.** Move away from reliance on NOAA funding to a more diversified funding base. This increases financial stability.

**5. Increase outside funding for education and outreach programs.** Move away from the conventional scientific view of education and outreach as add-ons and invest in them as integral features of the scientific enterprise. Public support must be cultivated as new science initiatives

are brought on line.

6. **Diversity.** Enlarge the K-12 educational program to reach the increasingly diverse audience of students who now populate South Florida's schools and think creatively about how to down-scale generic educational programs to meet the increasingly individualized needs of the nation's student population.

7. **Venue.** Redouble efforts to encourage RSMAS and the University of Miami to maintain the joint location of CIMAS with the two local NOAA labs. Should this prove not to be feasible, work with RSMAS to develop creative ways to maintain scientific collaboration from distributed locations.

Although CIMAS is a well managed and productive organization, it is clear that instability at OAR is eroding somewhat the morale of CIMAS leadership and scientists. We offer the following recommendations to NOAA headquarters in the spirit of being able to reap the full benefits of its investment in CIMAS and the other joint institutes.

1. **Point persons at OAR.** Designate two individuals at OAR to represent the interests of the joint institutes. One should be in the operational and administration end and the second at the science and policy end.

2. **Strategic planning.** Develop a mechanism to include the interests of the joint institutes in the strategic planning process.

In sum, the review committee expresses its strong support for the CIMAS operation. It produces high-quality, cutting-edge research that contributes to science and society. It is managed effectively and with foresight, minimizing the personnel problems that plague some of the joint institutes. It has responded splendidly to new scientific opportunities in the realm of ecosystem dynamics and air-surface interactions. The challenges that it faces are quite typical of those of the nation's scientific community – to think more broadly about its mission, to align its priorities to public needs, to view education and outreach as investments, and to evaluate continuously the impacts of its activities. We have little doubt that CIMAS will rise to these challenges and continue to contribute to NOAA's mission to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources.

**Dr. Patricia Gober**

Department of Geography  
Arizona State University  
Tempe, AZ 85287-0104  
Phone: (480) 965-7533  
Fax: (480) 965-8313  
gober@asu.edu

**Dr. Dennis W. Moore**

NOAA/OAR WASC Route: R/PMEL  
BLDG: 3 RM:

7600 SANDPT WY NE  
SEATTLE WA 98115-6349  
PH: (206)526-4146  
FAX:(206)526-4576  
Dennis.W.Moore@noaa.gov

**Ms. Margaret Davidson**  
NOAA/NOS EASC Route: N/CSC  
BLDG: RM: 228  
2234 SOUTH HOBSON AVE  
CHARLESTON SC 29405-2413  
PH: (843)740-1216  
FAX:(843)740-1297  
Margaret.Davidson@noaa.gov

**Dr. John Boreman**  
Acting Science & Research Director  
Northeast Fisheries Science Center  
Woods Hole Laboratory  
166 Water Street  
Woods Hole, MA 02543-1026  
(508)495-2000  
John.Boreman@noaa.gov

**Dr. Ernesto Hugo Berbery**  
Department of Meteorology  
3427 Computer and Space Sci. Bldg.  
The University of Maryland  
College Park, MD 20742 - 2425  
Phone: (301) 405-5351  
Fax: (301) 314-9482  
berbery@atmos.umd.edu